

CLAIMS

What is claimed is:

1. A multilayer pipe comprising,
  - (i) an outer layer of a segmented thermoplastic copolyester elastomer; and,
  - (ii) an annular core selected from the group consisting of chlorinated poly(vinyl chloride) ("CPVC"), and blends thereof with less than 25% by weight poly(vinyl chloride) ("PVC"), the annular core being coextensive with essentially the entire length of the body;  
the outer layer being cohesively bonded to the annular core to form a laminate;  
and,  
the copolyester elastomer being derived by polymerizing with each other (a) one or more dicarboxylic acids or their equivalents, (b) one or more long chain glycols, and (c) one or more low molecular weight diols.
2. The multilayer pipe of claim 1 wherein said pipe is a twin-layered pipe, and the copolyester elastomer comprises (1) 5-90 wt.% long chain ester units derived from at least one long chain glycol having a molecular weight of about 400-6000 and at least one low molecular weight dicarboxylic acid having a molecular weight less than about 300 and (2) 10-95 wt.% short chain ester units derived from at least one low molecular weight diol having a molecular weight of less than about 250 and at least one low molecular weight dicarboxylic acid having a molecular weight of less than about 300;  
the copolyester elastomer has a hardness in the range from about 40 – 72 Shore D;  
tensile stress at 82°C and 10% elongation in the range from about 500 psi to 2,200 psi measured as in ASTM D-638, 0.508 cm/min (0.2 in/min); and,  
is extrudable at a temperature in the range from about 170°C to about 250°C.
3. The twin-layered pipe of claim 2 wherein the annular inner core has a thickness, measured in the radial direction, in the range from 0.95 mm (38 mils) to 1.375

mm (55 mils), and the wall thickness of the copolyester elastomer layer is such as to satisfy applicable specifications of a plumbing code for CPVC.

4. The twin-layered pipe of claim 2 wherein the copolyester elastomer is thermally cohesively bonded to an outer sheath of a polymer selected from the group consisting of a thermoplastic polyurethane, a blend of CPVC and PVC, and an alloy of a partially crosslinked chlorinated olefin interpolymer.

5. The twin-layered pipe of claim 3 wherein the annular core is CPVC and the pipe has a nominal diameter in the range from 1.27 cm (0.5") to 2.54 cm (1.0") which pipe, at 23°C, can be bent at least 90° around a mandrel having a diameter no larger than 1.83 m (6 ft) without damaging the wall of the annular core.

6. The twin-layered pipe of claim 5 wherein the annular core is CPVC the pipe has a nominal diameter of 19.05 mm (0.75") and is flexible to an extent that a 4.54 kg (10 lb) weight at the end of a cantilevered section of pipe 24" long causes a deflection measured at the end of the pipe and recorded after approximately 30 seconds, is at least 50% greater than the deflection for a CPVC pipe of corresponding dimensions.

7. The twin-layered pipe of claim 2 wherein the outer tubular layer is copolyester elastomer blended with a miscible interpolymer of an  $\alpha$ - $\beta$ -ethylenically unsaturated carboxylic acid anhydride with an ethylenically unsaturated comonomer, in an amount from about 0.1 to 30% by weight of the blend, so long as the amount of interpolymer will not adversely affect the tensile stress or adhesiveness of the blend.

8. A method of producing an elongated hollow body of arbitrary length and cross-section comprising,

concurrently extruding an annular core of CPVC/PVC in a substantially uniform thickness, measured in the radial direction, in the range from 0.95 mm (38 mils) to 1.375 mm (55 mils), and an outer tubular layer of a segmented thermoplastic copolyester

elastomer having a hardness in the range from about 40 – 72 Shore D overlying the annular core in a substantially uniform thickness coextensive with essentially the entire length of the body cohesively bonded to the core, the wall thickness of the copolyester elastomer layer being sufficient to allow the hollow body to satisfy applicable specifications of a plumbing code for CPVC.

9. The method of claim 8 wherein the copolyester elastomer is derived by polymerizing with each other (a) one or more dicarboxylic acids or their equivalents, (b) one or more long chain glycols, and (c) one or more low molecular weight diols.

10. The method of claim 9 wherein the copolyester elastomer comprises (1) 5-90 wt% long chain ester units derived from at least one long chain glycol having a molecular weight of about 400-6000 and at least one low molecular weight dicarboxylic acid having a molecular weight less than about 300 and (2) 10-95 wt% short chain ester units derived from at least one low molecular weight diol having a molecular weight of less than about 250 and at least one low molecular weight dicarboxylic acid having a molecular weight of less than about 300;

the copolyester elastomer has a hardness in the range from about 40 – 72 Shore D;

tensile stress at 82°C and 10% elongation in the range from about 500 psi to 2,200 psi measured as in ASTM D-638, 0.508 cm/min (0.2 in/min); and,

is extrudable at a temperature in the range from about 170°C to about 250°C.

11. The method of claim 10 wherein the copolyester elastomer is blended with a miscible interpolymers of an  $\alpha$ - $\beta$ -ethylenically unsaturated carboxylic acid anhydride with an ethylenically unsaturated comonomer, in an amount from about 0.1 to 30% by weight of the blend, so long as the amount of interpolymers will not adversely affect the tensile stress or adhesiveness of the blend.

12. The method of claim 11 including coextruding an outer sheath coextensively cohesively bonded to and overlying the outer tubular layer, the outer

sheath being an oxidation-resistant polymer less than 0.125 mm (5 mils) thick, selected from the group consisting of a thermoplastic polyurethane, a blend of CPVC and PVC, and an alloy of a partially crosslinked chlorinated olefin interpolymer.